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THIS IS UNEVALUATED INFORMATION

SOURCE Newspapers, periodicals, and book as indicated.

INCREASE OF CAPACITY OF USSR POWER TRANSMISSION LINES AND SYSTEMS

/Numbers in parentheses refer to appended sources. Figures referred to are also appended./

Kuybyshev-Moscow and Stalingrad-Moscow Power Transmission Lines

These lines will normally transmit 400,000 volts, but will be built with a 5-percent allowance for a maximum working tension of 420,000 volts. An alternating current of 50 hertz' frequency will be transmitted through the line.

The 925 kilometer Kuybyshev-Moscow line will consist of two parallel three-phase circuits with a transmission capacity of 600,000 kilowatts each. To lower the inductive resistance, each phase will be split into three wires suspended at the tip of an equilateral triangle whose sides will be 400 millimeters long (see Figure 1). These bare iron-aluminum alloy wires will have a diameter of 30.2 millimeters, a tensile strength of 14,370 kilograms, and will weigh 1,800 kilograms per kilometer.

The wires will be suspended on H-shaped, welded steel girder poles imbedded in concrete foundations. In normal soils, the foundations will be formed of precast concrete blocks for intermediate poles, and of solid concrete cast on the spot for anchor and corner poles. Intermediate H poles, which are 29.8 meters high and weigh 7.25 tons each, will be spaced 425 to 460 meters apart (see Figure 2). Anchor and corner poles (see Figure 3) will be 29.6 meters high and their weight will vary in accordance with the angle at which the line changes its direction, as shown in the following table:

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Type of Pole	Angle of Change in Line Direction (in degrees)	No of Stays	Weight (tons)
Anchor and Corner	0 - 15	1	13.1
Corner	15 - 30	2	16.5
Corner	30 - 45	2	16.6
Corner	45 - 60	2	17.8

A chain of 22 porcelain, suspension-type PTs-7 insulators, each 185 by 300 millimeters, will be linked together and installed on the intermediate poles for each phase. In those regions with rigorous winters PTs-8.5 type insulators (tested to carry an 8.5-ton load) will be used instead of PTs-7 (tested to carry a 7-ton load). Three parallel chains of 22 Type PTs-11 insulators in each chain will be used on the anchor and corner poles. The PTs-11 insulators have a size of 210 by 350 millimeters and are tested to carry an 11-ton load.(1)

The bill of materials needed for 1,000 kilometers of a 400,000-volt, three-phase power transmission line is as follows (2):

1. Steel poles -- 2,500 pieces
   a. Angle iron -- 20,000 tons
   b. Steel reinforcement bars for concrete bases -- 3,500 tons
   c. Concrete -- 50,000 cubic meters
2. Insulators -- 300,000 pieces
3. Wire and steel rope
   a. Aluminum -- 12,000 tons
   b. Steel -- 5,000 tons (2)

The following work will be necessary to install two 3-phase circuits between Kuybyshev and Moscow (1):

Earthwork -- 700,000 cubic meters
Concrete work -- 200,000 cubic meters
Metallic structures-- 45,000 tons
Wire and wire rope-- 35,000 tons

The adoption of 400,000 volts for transmission does not mean merely enlarging all the electrical equipment and apparatus needed for the line and transformer stations, but designing them anew in accordance with entirely new engineering principles necessitated by the increased voltage. Since the new equipment will be expensive (one switch, 10 meters high, will cost several million rubles), ways have to be found to reduce the costs. Probably several generators of the Kuybyshev GES which will generate a 15,000- to 20,000-volt current will feed it into one step-up transformer.(2)

At the Moscow end of the line the current will be stepped down to 115,000 volts and then distributed.(1)

In spite of the expenses for construction of the costly transmission line, the electric power received in Moscow from the GES on the Volga River will still be two or three times cheaper than the power generated locally by steam.(2)

Donbass

The same high-tension power transmission lines which supplied power for the construction of the Tsimlyanskaya Hydraulic Center from the Donbass and even from the Dneper GES will be used in reverse to supply power from the Tsimlyanskaya GES to the mines and other industries of the Donbass, Rostov, Voronezh, and Lipetsk.(3)

Another 220,000-volt, three-phase power circuit, 156 kilometers long, was added to an existing power transmission line by the Donbassetstroy Trust in April 1951. The scope of work included erecting poles "C" and installing wires 4, 5 and 6 (see figure No 4), involving 18,885 cubic meters of earthwork, installation of 695 metallic poles weighing 1,400 tons, repairing 383 existing concrete bases and construction of 312 new concrete bases. It also included installing 686 tons of Type ASU-300 wire. Wires 1, 2, and 3, as shown on the figure, were installed before World War II.

Another line of 110,000 volts, 72 kilometers long, which was built in 1949, was reconstructed in the fall of 1951 by adding a three-phase circuit (wires a, b and c as shown on Figure No 5).(4)

Caucasus

A plan for unifying the electric power systems of the Caucasus into a single powerful system was being worked out jointly in February 1952 by the Electric Power Institute of the Academy of Sciences Georgian SSR, the Hydraulic Power Institute of the Academy of Sciences Armenian SSR, and the Electric Power Institute of the Azerbaydzhan SSR together with representatives of other republics and regions of the Caucasus.(5)

Urals

The city of Sverdlovsk receives its electric power from the Sverdlovsk electric power station through a 35,000-volt transmission line, from Chelyabinsk GRES, and from the SUGRES (Middle Ural Regional State Electric Power Station).(6)

Regional Ural Electric Power Systems

At a meeting of the Presidium of the Academy of Sciences USSR on 18 July under the chairmanship of Academician A. N. Nesmeyanov, the problem of development of rural electric power systems was discussed. V. I. Veyts, a corresponding member of the Academy of Sciences USSR and a representative of the Power Institute imeni G. G. Krzhizhanovskiy, reported that the institute had worked out a scientific basis for creating regional power systems which will unify all the rural electric power stations of different types and capacities by means of high-tension power-transmission networks. The resulting fuller exploitation of the steam electric power stations and GES will increase the efficiency of the GES from 40 to 70 percent and will free the output of large GES for other purposes.(7)

SOURCES

1. Moscow, Electrichestvo, No 7, Jul 52

2. A. A. Glazunov, Energeticheskiye sistemy i dal'niye elektroperedachi velikikh stroyek kommunizna (Power Systems and Long-Distance Power Transmission of the Great Construction Projects of Communism)

3. Moscow, Ogonek, No 23, 1 Jun 52

4. Moscow, Rabochiy Energetik, No 2, Feb 52

5. Yerevan, Kommunist, 24 Feb 52

6. Moscow, Elektricheskiye Stantsii, No 3, Mar 52

7. Vil'nyus, Sovetskaya Litva, 19 Jul 52

/Figures follow./

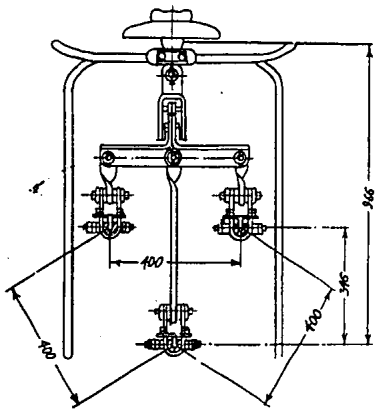

Figure 1. Suspension of One Phase Consisting of Three Parallel Wires

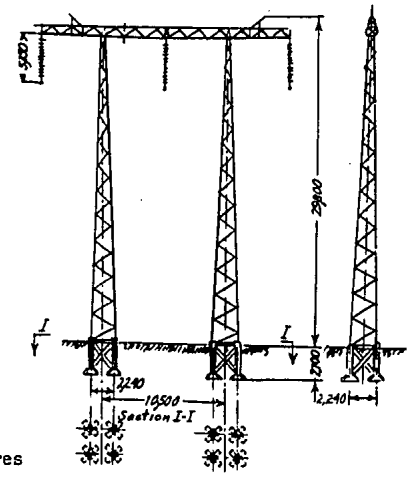

Figure 2. Intermediate Pole of 400 Kilovolt Transmission Line

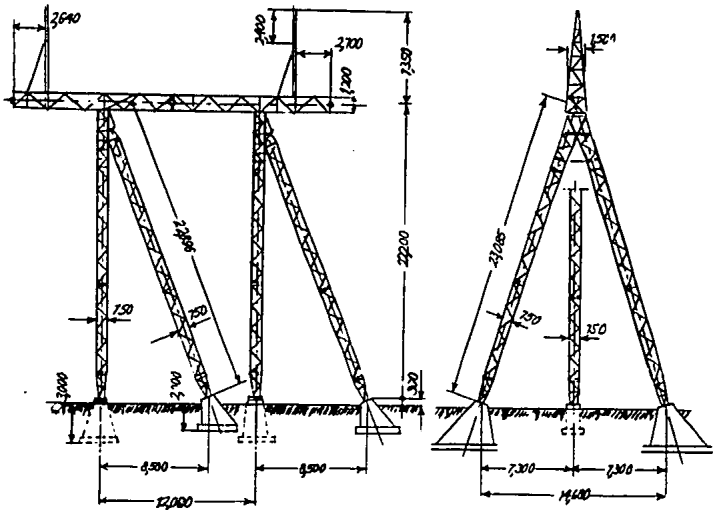

Figure 3. A Corner Pole of 400,000-Volt Line

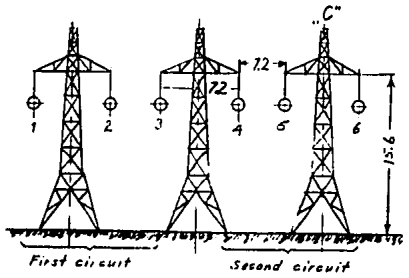

Figure 4. 220-Kilovolt Transmission Line

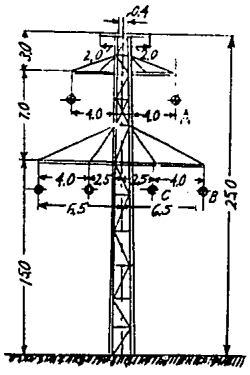

Figure 5. Two-Circuit Metallic Pole of 110,000-Volt Line

- E N D -